position, which rapidity of fusion is diminished by the more rapid removal of the heated gases from the surface of the composition. Hence the rate of burning of combustibles of this class depends upon the pressure of the medium in which they are consumed. In the case of time-fuses, the increments in the time of burning are proportional to the decrements in the pressure of the surrounding medium.

3. The luminosity of ordinary flames depends upon the pressure of the supporting medium; and, between certain limits, the decrease in illuminating power is directly proportional to the decrease in atmospheric pressure.

4. The variation in the illuminating power of flame by alterations in the pressure of the supporting medium depends chiefly, if not entirely, upon the ready access of atmospheric oxygen to, or its comparative exclusion from, the interior of the flame.

5. Down to a certain minimum limit, the more rarefied the atmosphere in which flame burns, the more complete is its combustion.

XVI. "On the Anatomy and Physiology of the Spongiadæ." Part II. By J. S. Bowerbank, LL.D., F.R.S., F.L.S., &c. Received June 17, 1861.

(Abstract.)

This paper is a continuation of the first division of the subject published in the Phil. Trans. for 1858.

In the second part of this division the author treats of the keratode or horny substance of the skeleton, as regards both its physical and chemical characters, with a view of establishing the animal nature of that substance.

In the third part the membranous tissues are described under two heads:—

1st. Simple membranous tissues analogous to those of the basement membranes of the higher classes of animals; and

2nd. Compound membranous tissues. These structures consist of simple membranous tissue combined with primitive fibrous tissue. Their most simple forms exist in the membranes lining the interstitial cavities of the sponge and in the dermal membrane.

In the fourth part the fibrous tissues are described as consisting of three principal divisions.

1st. Primitive fibrous tissue. These structures are exceedingly minute, and form an important element in the construction of the compound membranous tissues of the animal.

2nd division. The fibres of the skeleton are described under the following heads :—

1st. Solid simple keratose fibre.

2nd. Spiculated keratose fibre, in which the keratode is the primary element.

3rd. Multispiculate keratose fibre ; the spicula being the primary element, and the keratode the secondary or cementing medium.

4th. Inequi-spiculated keratose fibre. Consisting of skeleton fibres constructed of numerous spicula irregularly dispersed, but congregated into a round or oval massive fibre.

5th. Simple fistulose fibre. A keratose fibre having a continuous simple central canal.

6th. Compound fistulose fibre. A keratose fibre with a continuous central canal, from which secondary small canals branch at about right angles to the primary one.

7th. Regular arenated keratose fibre. Constructed of solid cylindrical fibres, in the centre of which there is a series of grains of sand or other extraneous matters.

8th. Irregular arenated keratose fibre. Consisting of grains of sand or other extraneous matters cemented together into a continuous cylindrical fibre.

In the third division the siliceous fibrous tissues are described as solid cylindrical structures, similar in form to the solid keratose fibres of the second division, but consisting of pure silex in place of keratode.

The fifth part contains descriptions of the cellular structures.

The sixth and last part of this division treats of the physical characters of the sarcode or semi-gelatinoid substance lining the interior cavities of sponges.

Part II.—*Organization and Physiology.*

The author treats this portion of his subject under the following heads :—

1st. The skeleton. Its general structure and component parts. Under this head the physiological purposes of the various forms of spicula, treated of in the first part of the paper, are described, and their peculiar offices in the sponge pointed out.

2nd. The sarcodous system is considered by the author as the homologue of the mucous lining of the stomach and intestines of the higher tribes of animals, and probably as the equivalent of the nervous system also.

3rd. The interstitial canals are considered as the equivalents of the stomach and alimentary canals of the higher animals.

4th. The intermarginal cavities, situated immediately beneath the surface, and receiving the incurrent streams from the pores, are believed by the author to be the organs for the secretion of the vital fluids of the animal.

5th. The dermal membrane, enveloping the whole of the sponge, and in which the inhalant and exhalant orifices of the animal are situated.

6th. The pores or inhalant orifices. These organs are not permanent; *i. e.* they are opened and closed at the will of the animal, and when once closed seldom occur again in precisely the same spot.

7th. The oscula or excurrent orifices, usually permanent organs, and capable of being opened or closed in accordance with the necessities of the animal.

8th. Inhalation and exhalation. Two modes of these operations are described; one as occasional or intermittent, but very powerful for the imbibition of nutriment; the other gentle and continuous for the purposes of the aëration of the vital fluids, and for the ejection of digested matters.

9th. Nutrition. The modes of imbibition and periods of digestion are treated of, and the author describes a series of contrivances by which some sponges are in possession of peculiar organs which enable them to prey upon annelids or other soft creatures that may crawl over their surface or intrude within their cavities or canals.

10th. Cilia and ciliary action. The accounts of the cilia of the gemmules or ova, as described by Dr. Grant and other writers, are referred to by the author; and the same organs *in situ* in *Grantia compressa* are pointed out as the powers on which inhalation and exhalation are dependent.

11th. Reproduction, gemmules, &c. Under this head the ovaries, ova, and gemmular modes of propagation, are described under five heads :—

1st. Ova without an ovarium.

2nd. Ova generated within ovaria.

3rd. Gemmules secreted within the sponge.

4th. Gemmules produced externally.

5th. By spontaneous division of the sarcode.

The remaining portions of the paper, consisting of observations on the generic characters, the specific characters, and on the mode of examination, will form the subject of a future communication.

XVII. "Further Observations upon the Nebulæ, with practical details relating to the Construction of Large Telescopes." By the Earl of Rosse, F.R.S. Received June 5, 1861.

(Abstract.)

In this paper the processes which were found best to answer in casting specula of 6-feet aperture have been described at some length; and the precautions which were taken to prevent accidents during the progressive stages of manufacture.

Some information, which may perhaps be useful, has also been gathered from the memoranda kept on each occasion when the specula were ground and polished; and the results of a long experience in the different manipulations have been put together in a practical form, so as best to enable the civil engineer to undertake the construction of large telescopes as a matter of business.

A few hints have been given on figuring and repolishing large surfaces, which the astronomer may find useful should his services be required in distant countries.

An attempt has been made to define the extreme limits to which telescopic vision may be pushed in this country, in answer to the question whether instruments of greater dimensions might not be advantageously constructed.

The peculiarities in the mounting of the large telescope are slightly noticed, and their advantages and disadvantages explained, as they have been brought out by experience.

This is followed by a selection from the observations made during